Synergy between the thermal-hydraulics of future fission and fusion power plants

P.F. Peterson[1] and C.S. Debonnel[1,2]

(1) University of California
4118 Etcheverry Hall
Berkeley, CA 94720
USA

(2) Lawrence Berkeley National Laboratory
1 Cyclotron Road MS 47RO112
Berkeley, CA 94720

Various aspects of the thermal-hydraulics of fusion power plants could benefit from future fission systems. For instance, advanced multiple-reheat helium Brayton cycle and ceramic heat exchangers are currently designed for fission power applications and could be used in fusion power plants as well. The Advanced High Temperature Reactor (AHTR) is a fission power plant currently under design that would make use of a molten fluoride-based salt coolant. Molten salts are also leading candidates for the thick-liquid structures envisioned to protect the target chamber of heavy-ion and Z-pinch inertial fusion power plants. Future studies of the AHTR could then help create the knowledge base and necessary experience to finalize various features of thick-liquid protected fusion power plants.